Fluorescent Dye Doped Optical Waveguide

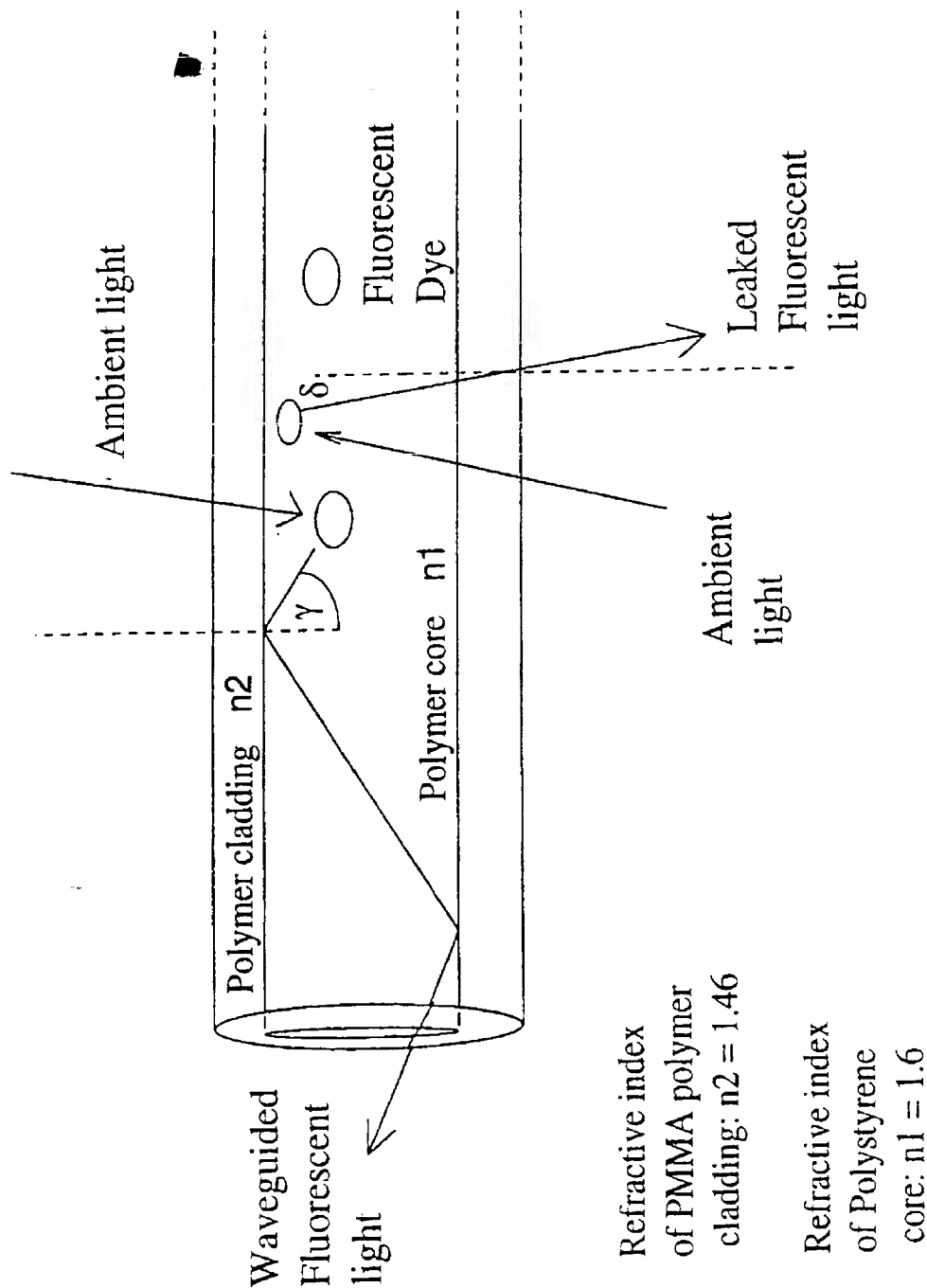Ambient light

Fluorescent
Dye

Leaked
Fluorescent
light

δ

Polymer cladding   n2

γ

Ambient
light

Polymer core   n1

Waveguided
Fluorescent
light

Refractive index
of PMMA polymer
cladding: n2 = 1.46

Refractive index
of Polystyrene
core: n1 = 1.6

Fig 1

Absorption-Emission spectra of Nile Red in polystyrene

———	0.050
——◇——	0.020
———	0.010
———	0.050
——◇——	0.020
———	0.010

Wavelength (nm)

Intensity

Fig 2

Fig 3

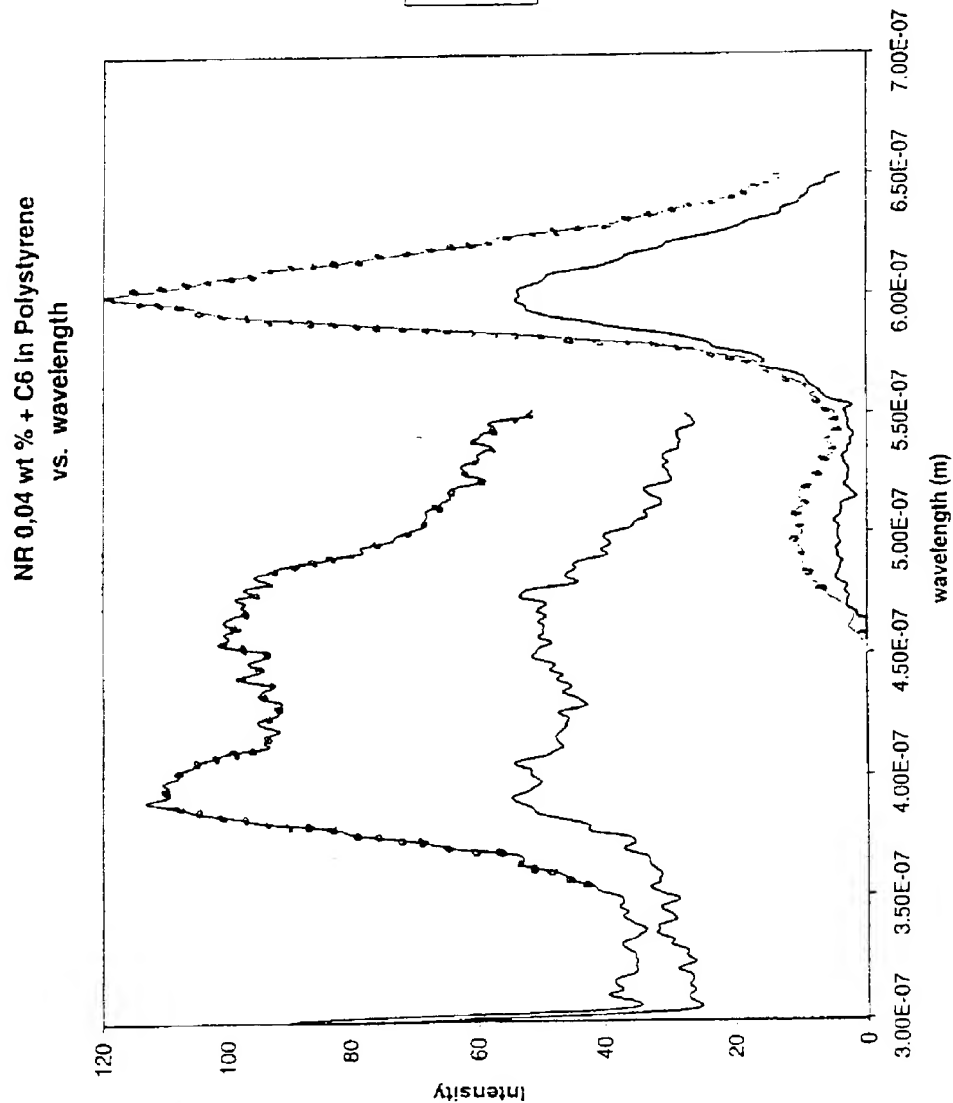Absorption-Emission spectra of Coumarin 6 in polystyrene

Fig 4

Fig 5

Nile Red + Coumarin 6 in Polystyrene

*Nile Red + Coumarin 6

Fig 6

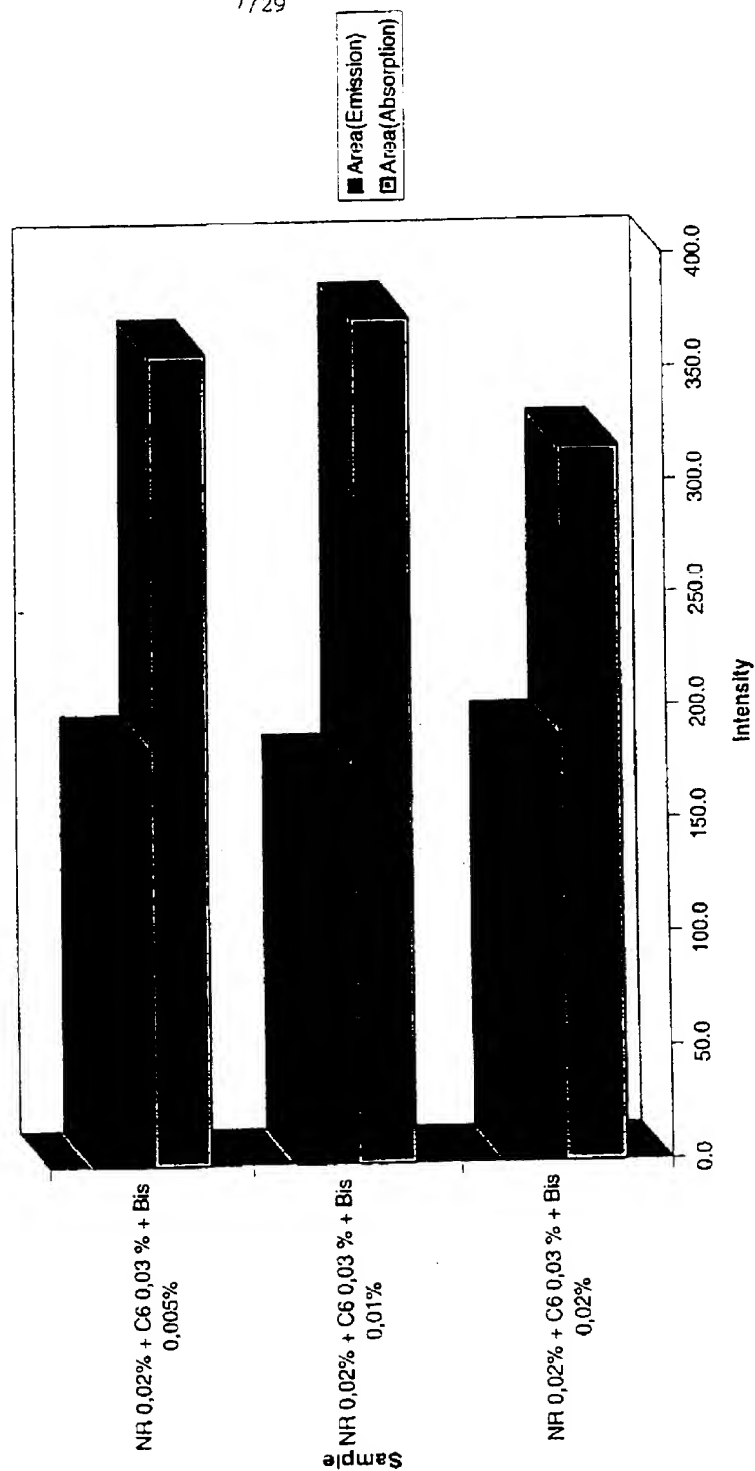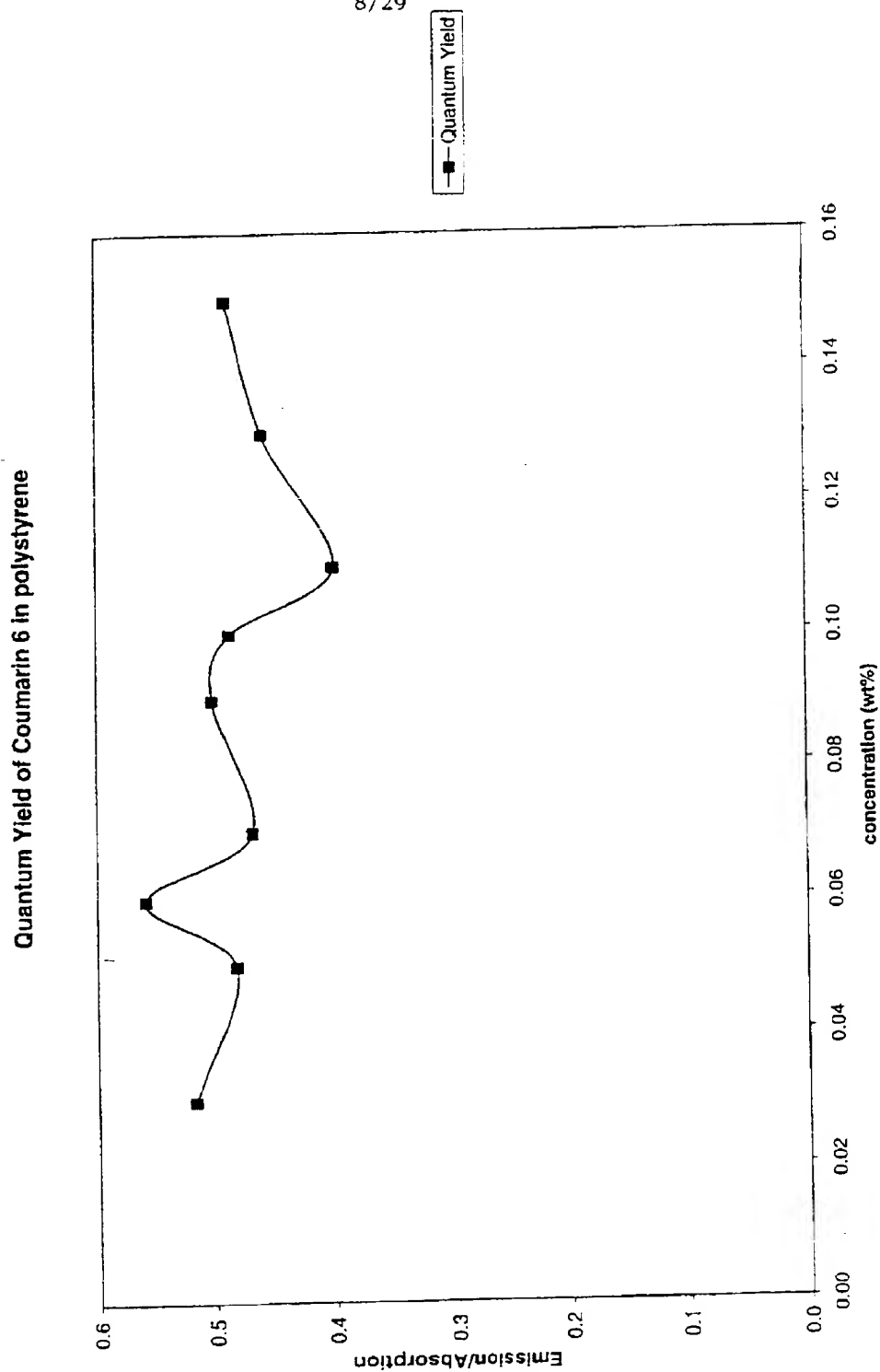Absorption - Emission Area of Nile Red 0,04% + Coumarin 6 + BisMSB

Fig 7

Quantum Yield of Coumarin 6 in polystyrene
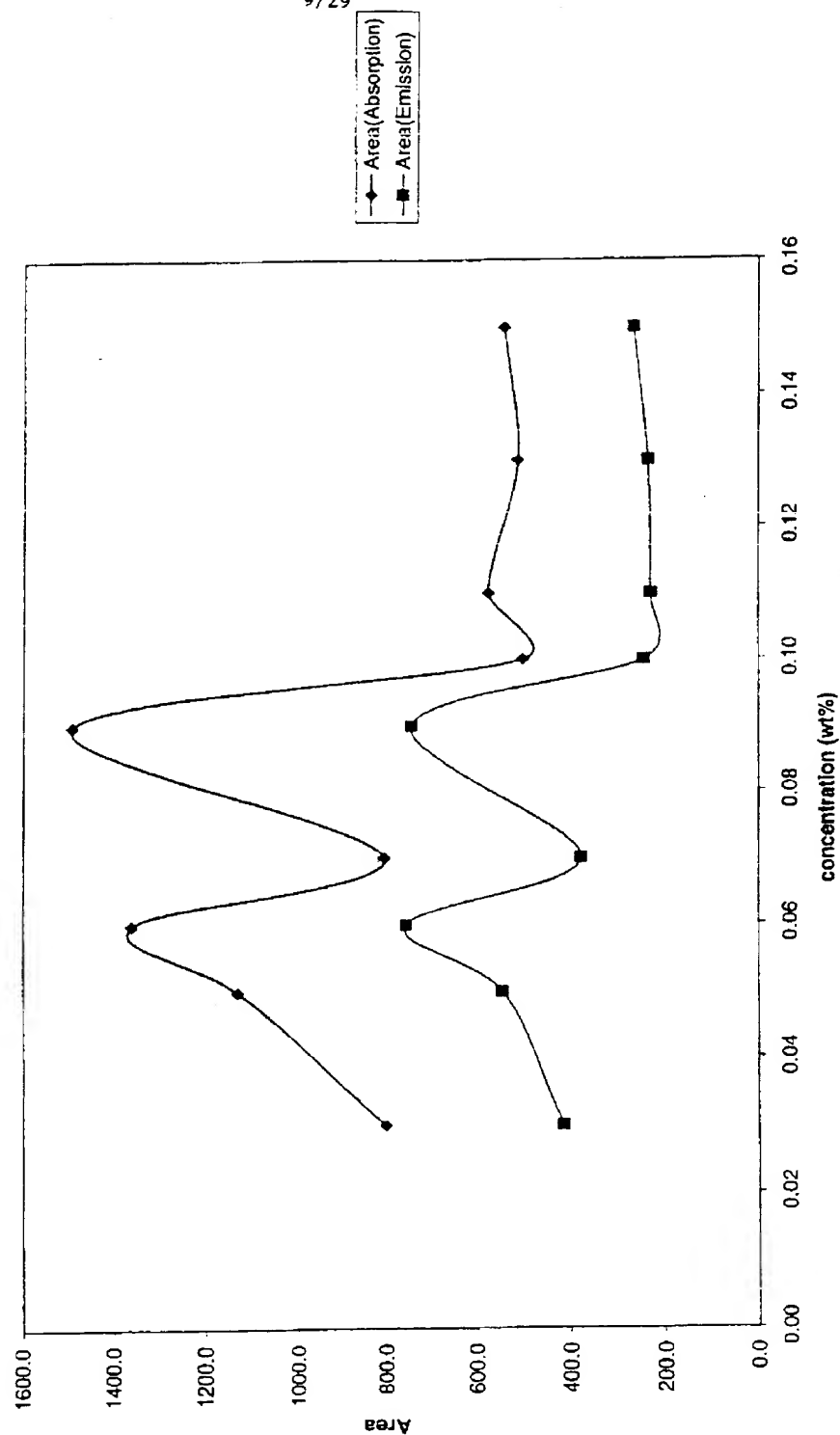
Fig 8

Fig 9

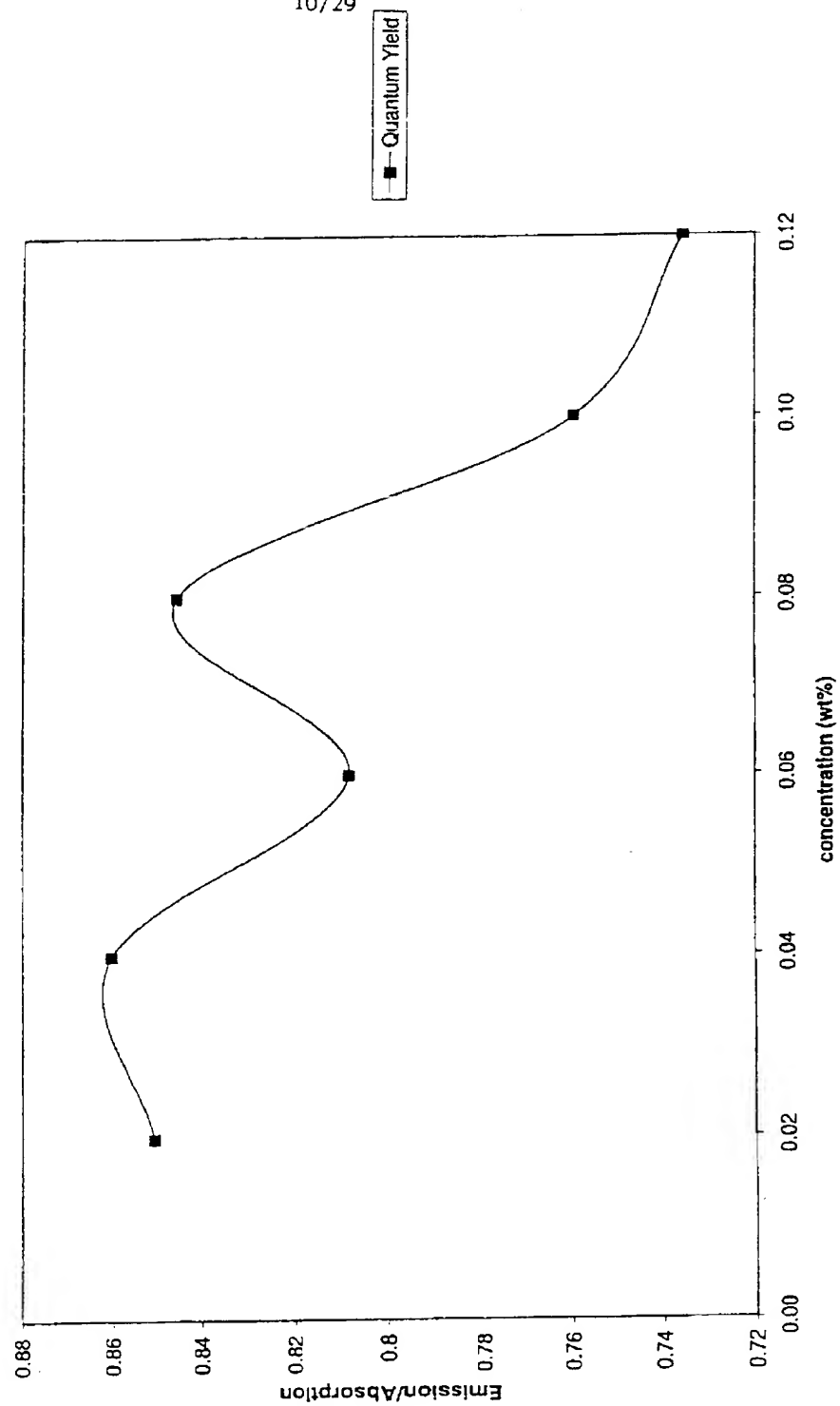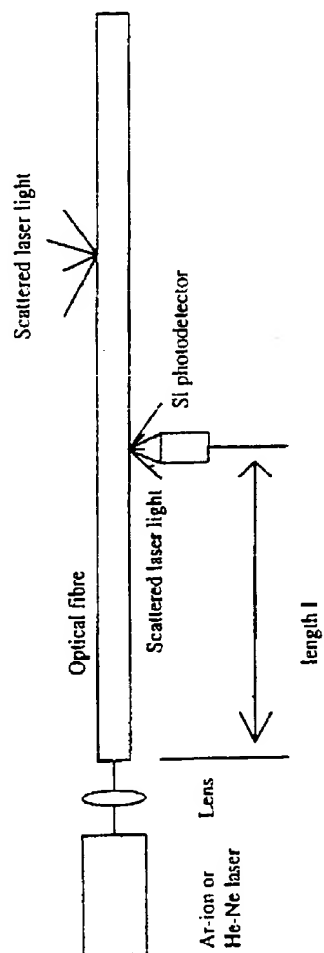
Quantum Yield of BisMSB in polystyrene

Fig 10

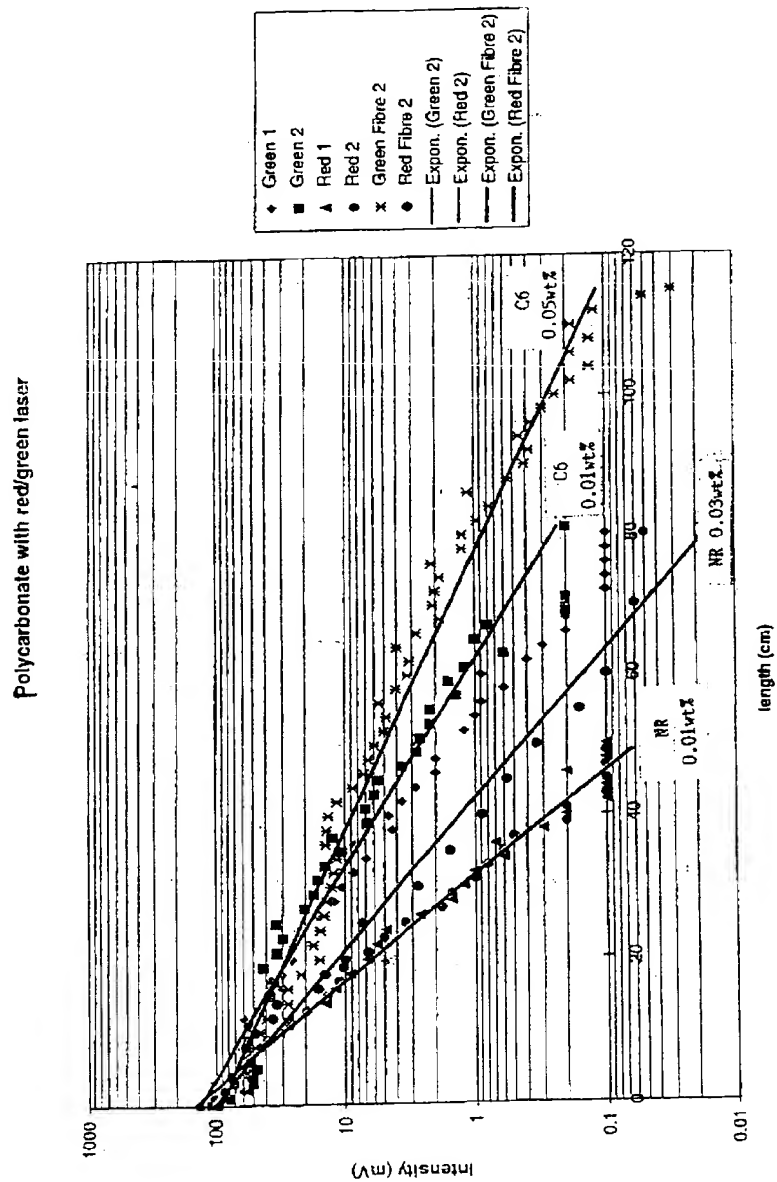Arrangement for light scattering/Absorption measurements

Fig 11

09/744709

Figure 12

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Refractive Index of C6 doped polystyrene

Fig 13

US/744709
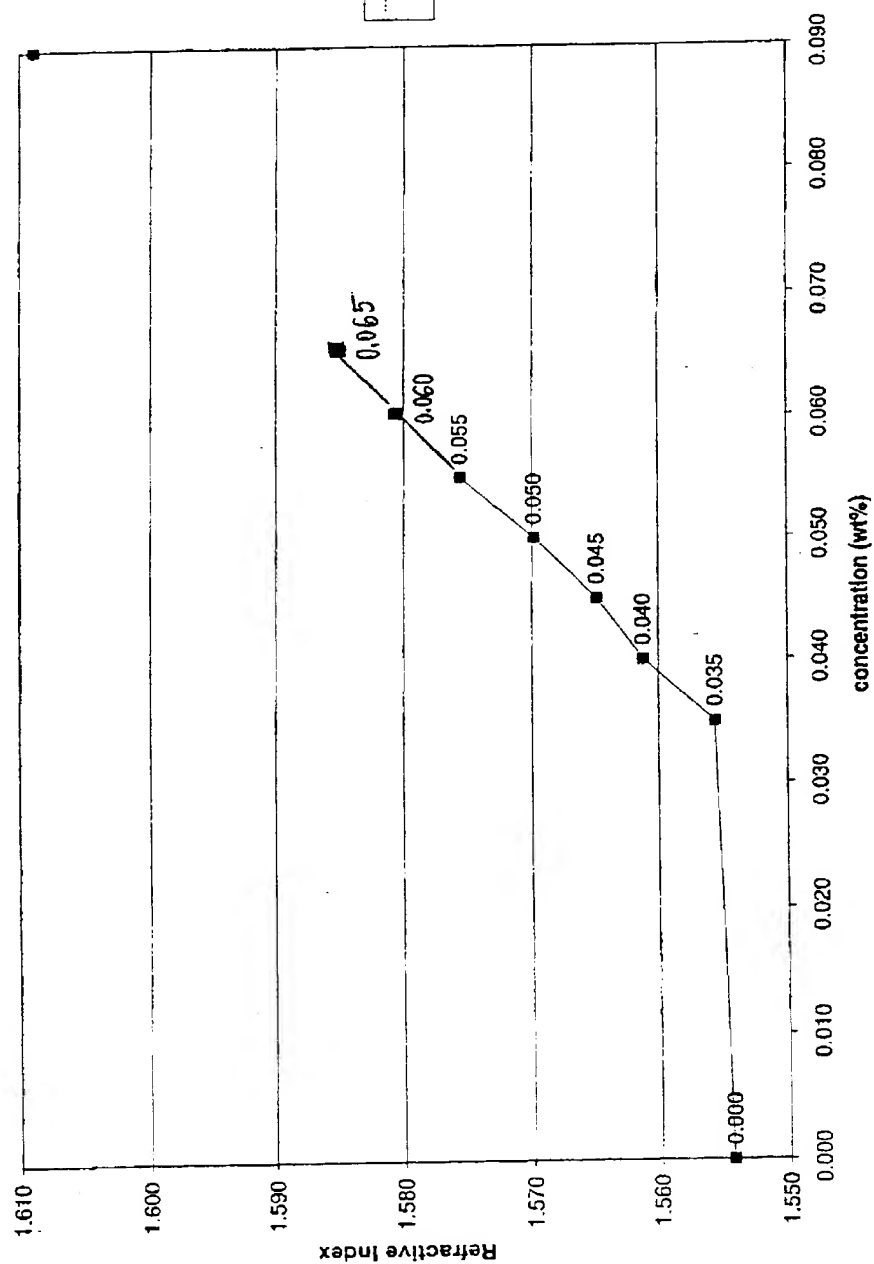
Intensity of the green/red fibre in sunlight while fibres are partially covered (normalised and an average of 7 measurements/ y-errors equals 2sigma)
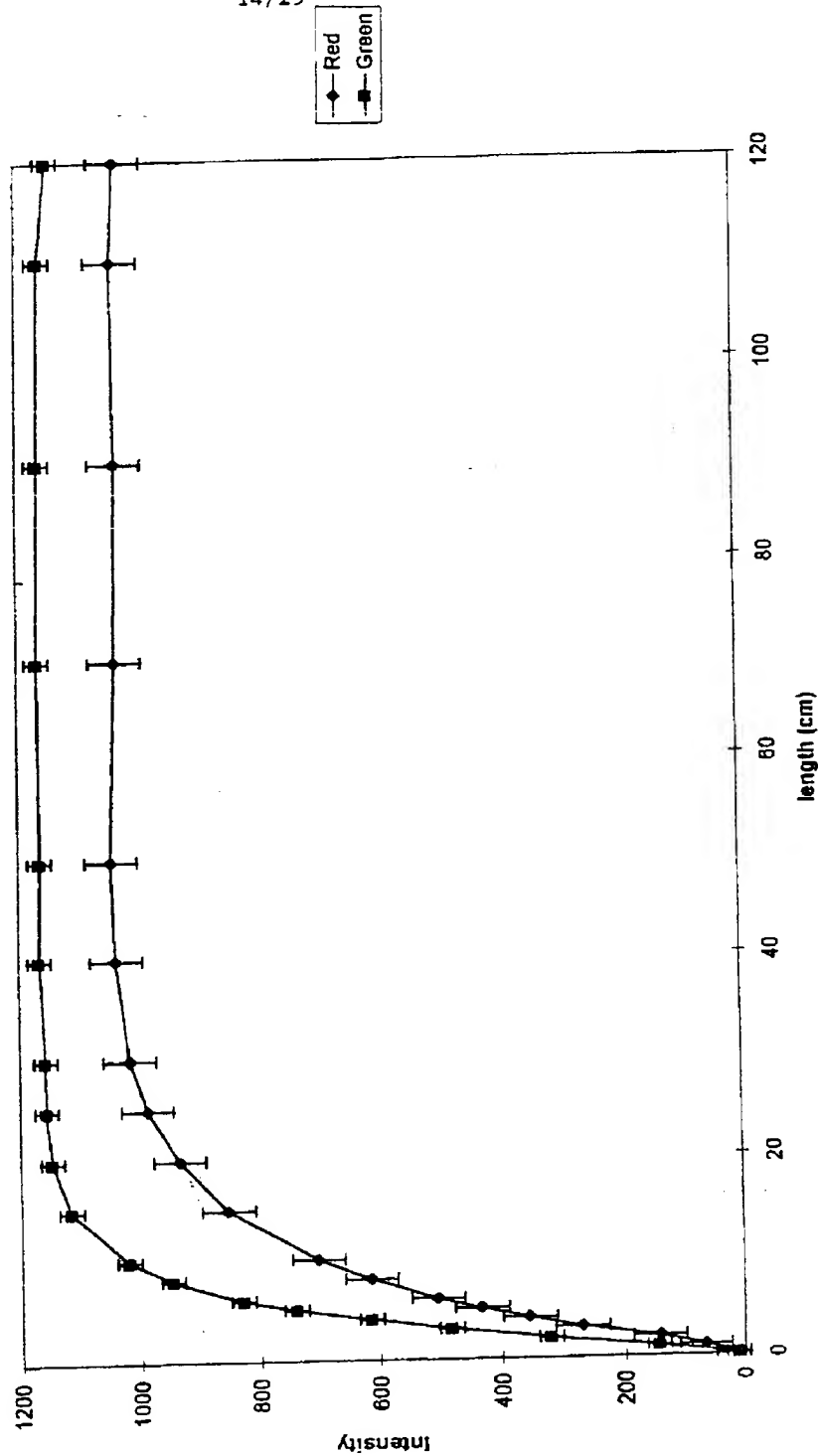
Fig 14

09/744709

Figure 15

Structure of Light Emitting Polymer
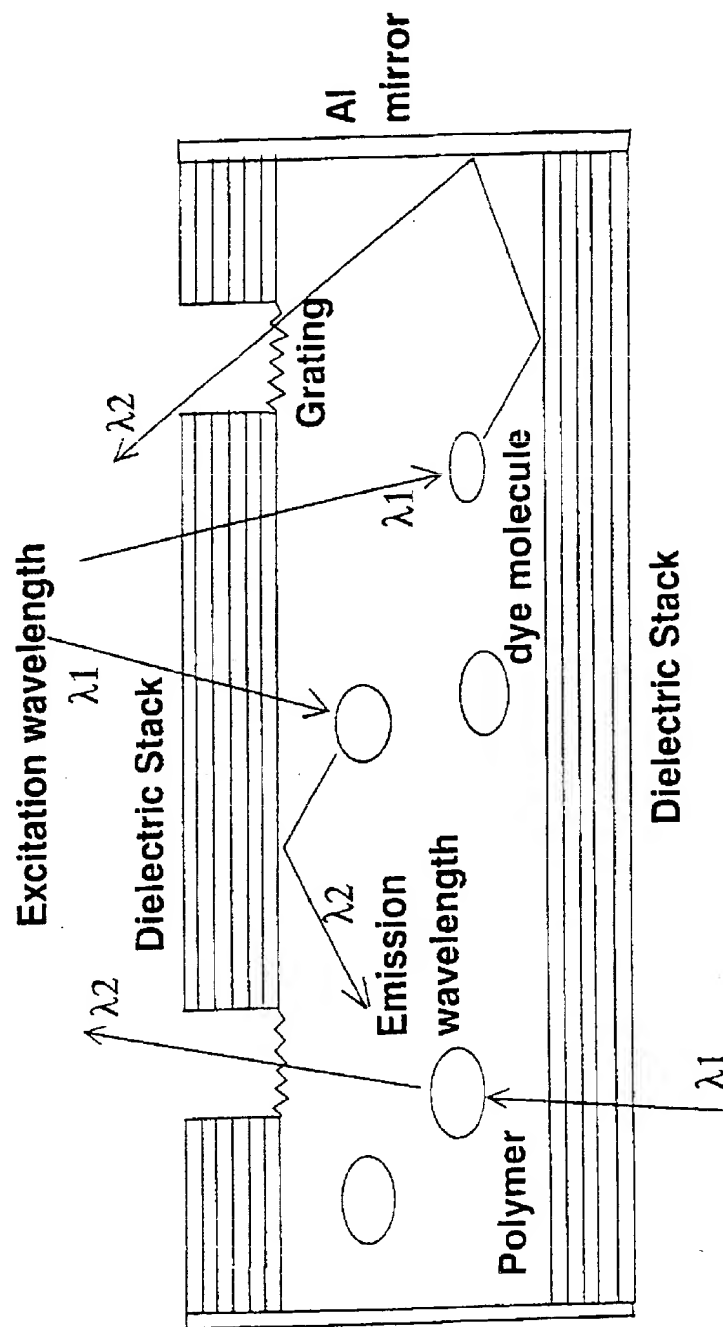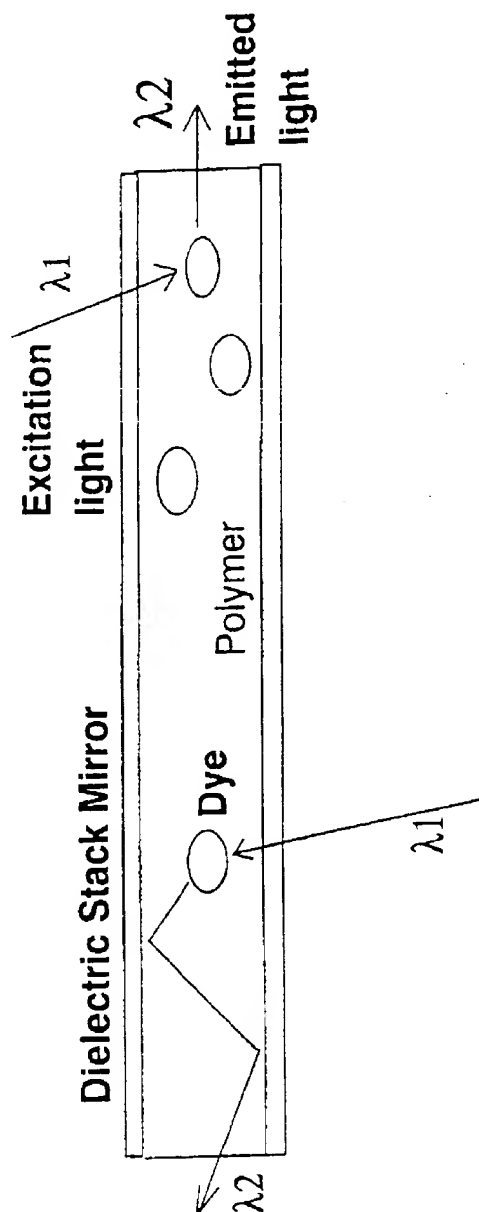## in combined reflective and transmissive mode

Figure 16

Structure of Light Emitting Polymer in the Edge Emitting Mode

Fig 17

Fig 18

Fig 19

Fig 20

Full Sunlight

Figure 21

Cloudy

Figure 22

Late Evening
(2 Hours After Sunset)

Fugure 23

Solar panel charges the
battery, which powers the
light sensor and night light.

Light source, powered by
battery, provides light with
appropriate spectrum, to
operate the display during
the hours of darkness.

Shuttering the ends
of light-emitting
fibres / rods creates
the display.

Light sensor
monitors ambient
light levels and
activates night light.

24 Hour Road Signage

Fig 24

Solar panel charges the
battery, which powers the
light sensor and night light.

Light source,
powered by
battery, provides
light with
appropriate
spectrum, to
operate the display
during the hours of
darkness.

Shuttering the ends
of light-emitting
fibres / rods creates
the display.

Light sensor
monitors ambient
light levels and
activates night light.

24 Hour Traffic Lights

Fig 25

Dielectric stack mirror
removed from the
surface, permitting the
trapped light from the
bulk material to escape.

Dielectric
stack mirror
coated onto
the surface.

Dye-doped
base material.

Fixed Advertisement.
Polymer sheet with dielectric stack
mirror coated on the surface

Fig 26

Sheet of
light-emitting
doped
material.

Sheet of light-
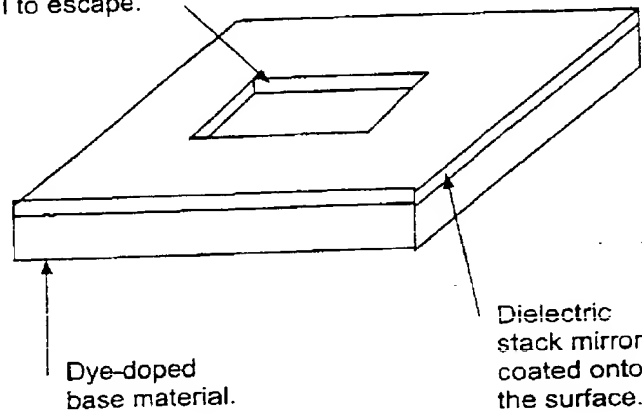absorbing
material

Transparent
material in
the shape of
a peg.
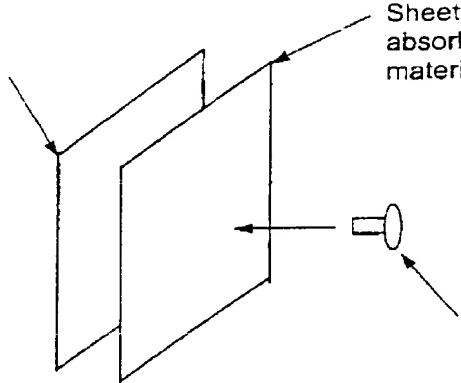
Fig 27

Sun radiates
light which is
absorbed by
the fibre.

Light also shines from the end of
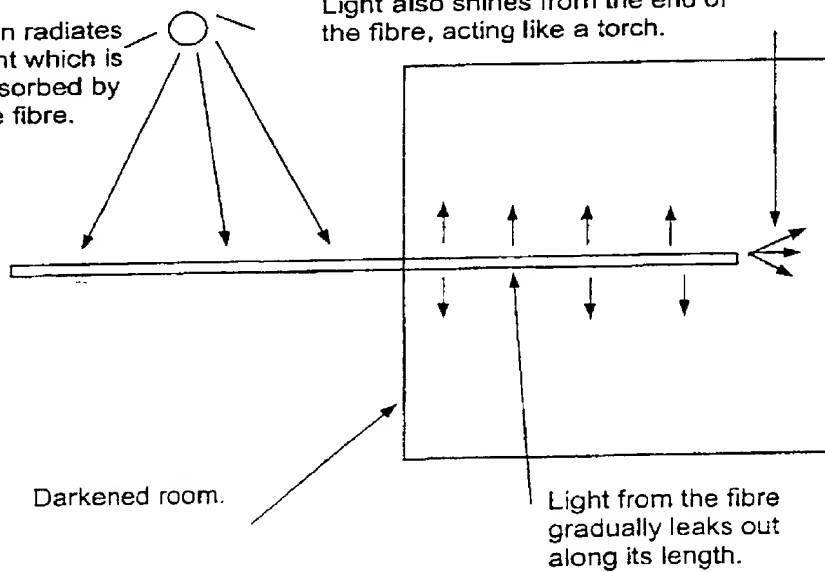the fibre, acting like a torch.

Darkened room.

Light from the fibre
gradually leaks out
along its length.

Fig 28

744709,

Light-emitting
rods angied
towards
aircraft.

Runway

Fig 29

Solar panel charges the
battery, which powers the
light sensor, night light and
communications receiver

Light source, powered by
battery, provides light with
appropriate spectrum, to
enhance the display during
the hours of darkness.

Shuttering the ends of
light-emitting fibres / rods
creates the display. The
combination of two
fluorescent dyes absorbs
light during both daytime
and night time. This
material also absorbs light
from street lights, and
provides a red display
during the hours of
darkness.

Light sensor
monitors ambient
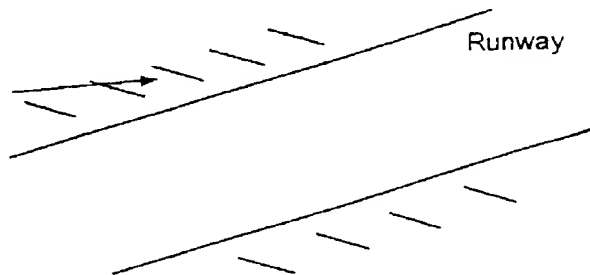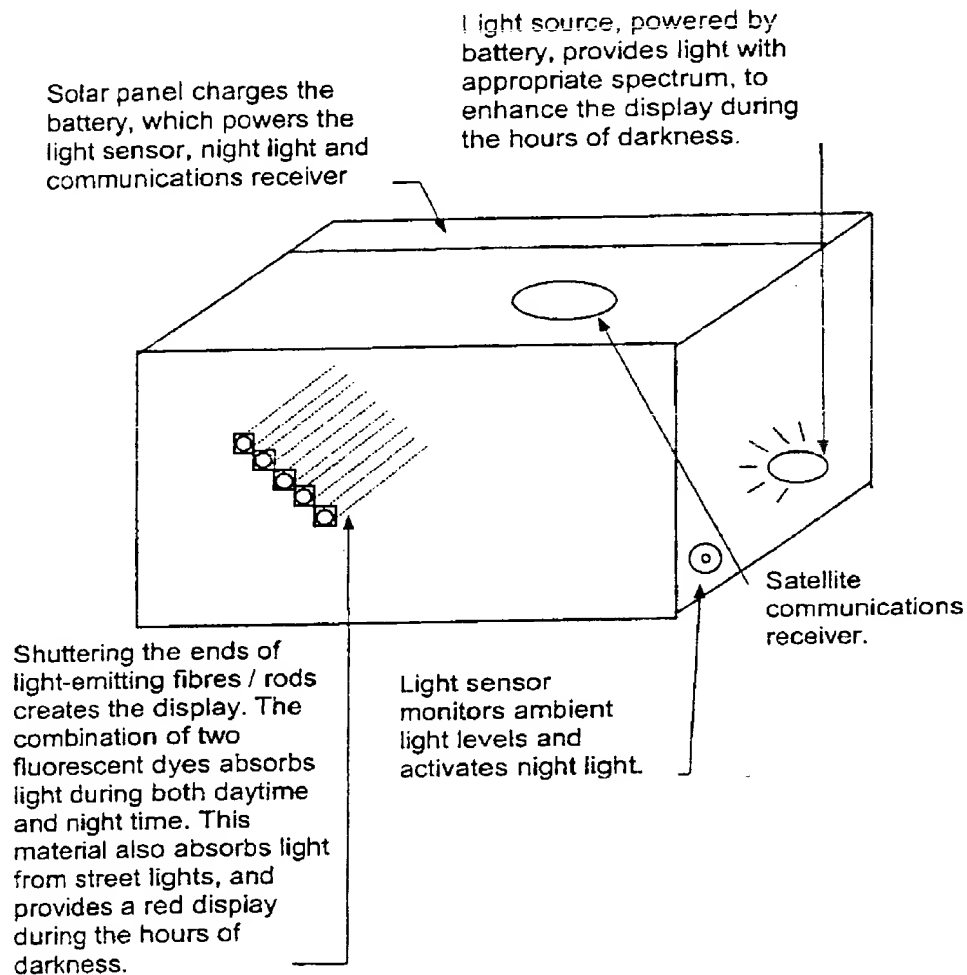light levels and
activates night light.

Satellite
communications
receiver.

24 Hour Bus Arrival Schedule

Fig 30